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A Study of The Effectiveness of Problem-Based Learning In The Curriculum Study

Eğitim Programında Problem Temelli Öğrenmenin Etkililiğine dair bir Çalışma

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Abstract

This study has two aims:(a) to address the main effects of problem-based learning on two categories of outcomes: knowledge and skills; and (b) to address potential factors of the effect of problem-based learning. For these purposes, the students in a problem-based curriculum with those in a conventional instructional curriculum were compared the results, when the two curricula were applied. Analyses indicate that students in the PBLcurriculum performed at least as well as, in some instances better than their counterparts in the conventional curriculum. Students in the PBL curriculum, a student-directed curriculum, were not disadvantaged. Of note is their strong practical (application) performance. Arguably the findings of this experimental study hold important implications for an educational programme and for effective pedagogic practice.

Key Words: Problem-based learning, conventional curriculum, effectiveness, self-directed learning, learning-centered environment.

Özet

Bu çalışmanın iki amacı vardır: (a) sonçların iki kategorisinde problem temelli öğrenmenin temel etkenlerine değinmek: bilgi ve beceriler; ve (b) problem temelli öğrenmenin etkisinin potansiyel faktörlerine değinmek. Bu amaçlar için, iki eğitim programı uygulandıktan sonra problem temelli eğitim programındaki öğrencilerle geleneksel eğitim programındaki öğrencilerin sonuçları karşılaştırıldı. Analizler gösteriyor ki problem temelli öğrenmeye dayalı eğitim programındaki öğrenciler en az geleneksel eğitim programındaki öğrenciler kadar iyi performans sergilemişken bazı durumlarda da onlardan daha iyi performans sergilemiştir. Öğrenci temelli bir program olan problem temelli eğitim programındaki öğrenciler dezavantajlı değildi. Onların güçlü pratik (uygulama) performansları dikkate değerdir. Muhtemelen bu deneysel araştırmanın bulguları, etkili pedagojik uygulama ve bir eğitim programı için önemli öneriler içeriyor.

Anahtar kelimeler: Problem temelli öğrenme, geleneksel eğitim programı, etkililik, bağımsız öğrenme, öğrenme merkezli çevre

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Giriş

The complexity of today's society is characterized by an infinite, dynamic and changing mass of information, the massive use of the internet, multimedia and educational technology, a rapid changing labor market demanding a more flexible labor force that is directed towards a growing proportion of knowledge-intensive work in teams and long life learning. As a consequence, today's information community expects graduates not only to have a specific knowledge base but also to be able to apply this knowledge to solve complex problems in an efficient way.

Educational researches have shown that successful problem solvers possess an organized and flexible knowledge base and master the skills to apply this knowledge for problem solving (Chi, Glaser and Rees, 1982). An important challenge for today's higher education is the development and implementation of instructional practices that will faster in students the skill to apply knowledge efficiently. For this purpose references are made to the design of "powerful learning environment"(De Corte, 1990). Such powerful learning environments should support the constructive cumulative, goal-oriented acquisition processes in all students, they should allow for the flexible adaptation of the instructional support, especially the balance between self-discovery and direct instruction (De Corte, 1995). Further such environments should use as much as possible representative authentics, real life contexts that have personal meaning for the learners, and offer opportunities for distributed and co-operative learning through social interaction. Powerful learning environments should provide possibilities to acquire general learning and thinking skills embedded in different subject-matter and assessment should be congruent with the learning. One of these innovations is problem-based learning. A major question is: do students from the problem-based learning (PBL) reach the goals (knowledge and skills, i.e. knowledge application) in a more effective way than students who receive conventional instruction? In order to find an answer to this question, this study was conducted.

As a background of PBL, the problem-based learning started from Dewey, Piaget, Bruner, Rogers, Ausubel- Six core characteristics of PBL are distinguished in the core model described by Barrows (1996).The first characteristic is that learning needs to be student-centered. The second, learning has to ocur in small student groups under the guidance of a tutor. The third characteristic refers to the tutor as a facilitator or guide. The fourth, authentic problems are primarily encountered in the learning sequence, before any preparation or study has occurred. The fifth, the problems encountered are used as a tool to achieve the required knowledge and the problem solving skills necessary to eventually solve the problem. Finally, new information needs to be acquired through self-directed learning. It is generally recognized that a seventh characteristic should be essential for PBL is that students learn by analysing and solving representative problems. Consequently, a valid assessment system evaluates students'competencies with an instrument based on real life, i.e. authentic problems. For the solving problems, the assessment of application of knowledge

is the heart of the matter. Test items require examinees to apply their knowledge to commonly occur and important problem-solving situations.

It should be noted that just as the PBL definition is ambiguous, the definition of what conventional lecture-based program is also ambiguous as well. For the most part, conventional instruction is marked by a large group lectures and instructor-provided learning objectives and assessments. In this sense, teaching is a complex cognitive activity. As it is commonly known, teachers must juggle many goals as they coordinate pedagogical actions with various kinds of knowledge such as subject matter knowledge, pedagogical content knowledge, and knowledge of individual students. For experts, teaching is a problem-solving context in which they must come to understand the meaning of students' ideas rather than just correct them. PBL is an instructional method in which students learn through solving problems and reflecting on their experiences. In the PBL the teacher's role is to facilitate collaborative knowledge construction. In this study we first consider differences between student-centered and teacher-centered classrooms.

In the PBL, the role of the teacher becomes to guide the learning process rather than provide information. PBL is a premier example of a student-centered learning environment as students co-construct knowledge through productive discourse practices. The PBL method requires students to become responsible for their own learning. The teacher is facilitator of students learning, and his/her interventions diminish as students progressively take on responsibility for their own learning processes. This method is characteristically carried out in small, facilitated groups and takes advantage of the social aspect of learning through discussion, problem solving, and study with peers (Hmelo-Silver, 2004). Facilitator (Teacher) guides students in the learning process, pushing them to think deeply, and models the kinds of questions that students need to be asking themselves, thus forming a cognitive apprenticeship (Collins, Brown and Newman 1989). As a cognitive apprenticeship, PBL situates learning in complex problems (Hmelo-Silver, 2004). Facilitators make key aspects of expertise visible through question that scaffold student learning through modeling, coaching, and eventually fading back some of their support. In PBL the facilitator is an expert learner, able to model good strategies for learning and thinking rather than providing expertise in specific content. This role is critical, as the facilitator must continually monitor the discussing, selecting and implementing appropriate strategies as needed. As students become more experienced with PBL, facilitators can fade their scaffolding until finally the learners adopt much of their questioning role. Student learning occurs as students collaboratively engage in constructive processing. The dilemma for the facilitator is to provide affordances fort his constructive processing in the same way. She/he provides and organizes a learning culture. Briefly, the facilitator's overall educational goals for the students were effort them to be able to:

explain program developing process,
employ an affective reasoning process,
be aware of knowledge limitations,
meet knowledge needs through self-directed learning and social construction, and evaluate their learning and performance.
At the same time , the facilitator's performance goals were to:

1)to keep all students active in the learning process,
2)to keep the learning process on track,
3)to make students'thoughts and their dept of understanding apparent, and
4)to encourage students to become self-reliant for direction and information.

The educational goals refer to what the students were expected to learn, whereas the performance goals refer to behaviours that the facilitator wanted to encourage (in support of educational goals). The remainder of the results are organized in terms of strategies. The strategies can be used to achieve multiple goals that reflect a belief in learning as a collaborative sense-making activity and a belief that students bear much of the responsibility for their own learning.

The PBL process refers to the small group process that features (ill) structured problems, hypotheses generation, revision, evaluation, inquiry, decision-making, idetification of learning issues, self-directed study, and reflection. The blackboard is also often used. When using the PBL routine, the bareils are cleaning up one by one. From the beginning to the end, it should be done:
-introduce problem and asking questions,
-make points, give ideas and to discuss them,
-give evidences and moving productive and directions,
-helping to make students understanding and think , and
-guide them towards the goals.

There should be provided a dynamic interaction of the teachers, beliefs goals and knowledge. It is made clear in each stage, orchestrate group discussions through questioning to test hypotheses in during course.

The PBL setting provides a cognitive apprenticeship that acculturates students into the thinking practice of curriculum development. They develop the useful habit of questioning their own thinking. It is important for facilitators to make explicit their educational and performance goals and to identify strategies that can be used to achieve those goals. It is critical for facilitators to be reflective in terms of evaluating how effective strategies are in achieving desired goals.

The PBL has been introduced into education in many professional fields and it has become part of the generally articulated outcomes as advantages for education at all levels. Of course it has been used with others such as inquiry-based learning, questions and responses, discussions, etc,. There is no agreement about whether there is, or should be, one type of PBL or many variants. But a distinction that does appear useful is made by Bereiter and Scardamalia (2000) between PBL and problem-solving learning. The problem-solving learning refers to an indefinite range of educational approaches that give

problems a central place in the learning activity. Practitioners of the PBL, on the other hand, tend to adhere to the structures and procedures first systematized by Howard Barrows(1986). The central to this system is a conception of learning as an integrated process of cognitive, meta-cognitive, and personal development. Barrow argues that a more accurate title for the model he and his collaborators developed might be "student-centered", problem-based, inquiry-based, collaborative, reiterative, learning. It is not my intention here to describe the many different theories of learning and teaching that appear to provide the principles that underpin PBL .Because there are many versions and established many different dimensions of PBL. Arguably, across the various the PBL literatures, five key features of a PBL, curriculum can be distinguished:
teacher as facilitator,
the use of an explicit process to facilitate learning,
use of problems to stimulate, contextualise and integrade learning,
learning in small groups, and
assessment and problem-based learning.

The stages may be worked through sequentially, but often students will move backward and forward between the stages during each cycle as they spend more time thinking and discussing the issues. Teacher is as facilitator and tutor. A small group is an integral part of the PBL approach, used consciously and coscientiously to achieve the learning outcomes. Feedback and reinforces are used in the right situations. Students must take responsibility for the learning process and for the functioning of the group. It is argued that the development of skills for communication, and the development of knowledge, and collaboration are best fostered in groups with between five and ten members. Assessment can be done the process-based and the goal-based assessment in the PBL. Students also require to evaluate each others performance. In addition to this, evidence-based assessment can be done orally (Newman, 2005). Although the example here is set in the context of curriculum studies, the lessons are applicable to PBL in other domains.

From the teaching point of views, teachers are potentially the single most important asset in the achievement of the vision of a learning society. The modern day teachers should be prepared to take roles of not just knowledge disseminators but also knowledge creators and knowledge managers. They are expected to play a more active role in relation to the process of knowledge construction in which students are engaged. Teachers therefore ought to be trained in using their own individual learning curricula as a means of generating and regenerating the understandings, critical thinking skills, emotional intelligence, craft skills, and intellectual flexibility to be committed to lifelong learning. Teachers are able to embrace the challenge of new teaching roles and see these as challenges rather burdens to be borne. One of the approaches that services to meet the challenges of teacher education is problem-based learning. It is a kind of the approach to curriculum development and instructional approach that recognizes the need to develop problem solving skills as well as the necessity of helping students to acquire necessary knowledge and skills. This approach with its emphasis on collaborative inquiry should strengthen the links

between teaching and research. The strengthening of these links is beneficial for undergraduate university education. The task of educators is to acknowledge, cultivate, exploit and enhance the meta-cognitive capabilities of all learners. Meta-cognition or awareness of the process of learning is a critical ingredient to successful learning.

One form of curriculum often promoted by student learning theorists is problem-based learning. Although the PBL looks different at various schools and the levels, the three main and common characteristics can be considered as essential:1) problems as a stimulus for learning, 2) teachers as facilitators of learning process, and 3) group work as stimulus for interaction.

Within PBL, students work in small groups to discuss problems under the guidance of a teacher. The teacher acts to facilitate the learning process, rather than to provide knowledge. The interaction in the small group around the problems is assumed to stimulate students to adopt a deep learning approach (Dolmans, Wolfhagen and Ginns, 2010).

The essential feature of a teaching system designed to emulate professional practice is that the crucial assessments should be performance-based, holistic, allowing plenty of scope for students to input their own decisions and solutions. This requires criterion, rather than norm, referenced assessment, adopting a much more holistic and divergent approach, involving significant peer and self-assessment, all features which inquiry and problem-based curricula increasingly reflect. For thinking strategically about assessment, it is important to adopt a more strategic approach to assessment by asking ourselves a series of questions:

-Why are we assessing?
-What are we assessing?
-When are we going to assess?
-Who is going to carry out the assessment?
-How are we going to assess?
-Where will the assessment take place?
-How are we going to grade/mark?
-What feedback will students receive?

When we find the answers of all above the questions, a suitable assessment approach should be used..

The inquiry and problem-based learning are processes leading to a variety of outcomes and that the challenge is to use assessment to contribute to more effective learning, not merely to lead to marks or grades. The real challenge is to make assessment a rewarding, challenging and even fun part of a similarly rewarding, challenging and fun learning experience. It may be listed the methods of assessment in inquiry and PBL here:

.group presentations
.tripartite assessment (research, present, report, summit)
.case-based individual essays
.individual presentations
.case-based care plans
.portfolios

.triple jump (research, material, oral skills, knowledge)
.self-assessment
.peer assessment
.viva voce examinations (practice in situations)
.reflective journals (online)
.reports
.patchwork texts (written form)
.examinations
.electronic assessment
.self-peer assessment, collaborative assessment.

As is mentioned, the PBL can be applied at all levels of learning across many different disciplines and professions. It provides an antidote to the increasing fragmentation of information and knowledge and promotes the connectedness of ideas, information and knowledge. It also helps students to learn how to learn and leads to sustainable learning.

A major goal of the tutorial process in the PBL is to generate questions that lead to the acquisition of new knowledge that builds upon and connects with existing knowledge. Recognition and articulation of preexisting knowledge helps providing a link for newly acquired information and aids in its storage and reiteraval. Students discuss, debate, compare and contrast their learning with each other. The newly acquired information is applied to the problem, hypotheses are reevaluated or changed, and associated mechanisms are analyzed and synthesized. At the end of the case, students summarize what they have learned and reflected on their progress as a group and as individuals. Students in the PBL more often indicate that they study for understanding and meaning. They use the library more often, utilize a wider variety of learning resources, and choose those resources in a self-directed way rather than as assignments from lecturers.

The majority of the data concerning outcomes of PBL are descriptive and quasi-experimental. To data, research related to PBL has been more descriptive than predictive. The PBL seems to be more enjoyable and stimulating way to learn. But problem solving is specifically regarded as the most important cognitive activity in everyday and professional contexts. Most people are required to and rewarded for solving problems. However, learning to solve problems is too seldom required in formal educational settings, in part, because our understanding of its processes is limited. Instructional-design research and theory have devoted too little attention to the study of problem-solving processes. We do also not understand the breadth of problem-solving activities well enough to engage and support learners in them. The problem is that the problem-solving has never been sufficiently acknowledged or articulated in the instructional design literature.

The problem-solving is not a uniform activity. Problems are not equivalent, in content- form, or process. Problem-solving skill is dependent on a schema for solving particular types of problems such as logical problems, algorithmic problems, story problems, rule-using problems, decision-making problems, troubleshooting problems, diagnosis-solution problems, strategic

performances, case-analysis problems, design problem, dilemmas, and meta-problems, etc. Each one has different features from anther, however, for the all above, it may be to have a common checklist of the features to be designed into courses as following:

. learning is student-centered,
. learning occurs in small groups,
. a teacher is presented as a facilitator,
. authentic problems are presented at the beginning of the course,
. the problem encountered are used as tools to achieve the required knowledge and problem-solving skills to solve the problem,
. new information is acquired through the self-directed learning,
. learning is achieved by analyzing and solving represented problems.

Of course, it should be focused to plot a course for learning efforts and an environment which facilitates learning and techniques which enable learning to be efficient. When we analysis the problem-based learning, it could be understood that the problem-based learning is a part of constructive learning process. As it is remembered, instructional principles deriving from the constructivism are as follows:

1)understanding is in our interactions with the environment,

2)cognitive conflict or puzzlement is stimulus for learning and determines the organization and nature of what is learned.

3)knowledge evolves through social negotiation and through the evaluation of the viability of individual understandings.

From these principles' point of views, it might be put almost the same principles for the PBL such as:

.Anchor all learning activities to a larger task or problem,
.Support the learner in developing ownership for overall problem or task,
.Design an authentic task(engaging in happening),
.Design the task and the learning environment to reflect the complexity of the environment they should be able to function in the end of learning,
.Give the learner ownership of the process used to develop a solution,
.Design the learning environment to support and challenge the learner's thinking,
.Encourage testing ideas against alternative views and alternative contexts,
.Provide opportunity and support reflection on both the content learned and learning process.

These instructional design principles can be led to a wide variety of learning environments. In our own examination of learning environment, we have found one application that seems to us to almost ideally capture the principles. That is the problem-based learning model of Howard Barrows (1985; 1992).

As with any instructional model, there are many strategies for implementing the PBL. Rather than attempting to provide a general characterization of the PBL, we would like to focus on Barrows' model (Barrows, 1992) to provide a concrete sense of the implementation of this process in the faculty of education. In according with this model, when students enter the

curriculum studies' course, they are divided into groups of six and each group is assigned a facilitator. The students are then presented a problem in the form of the process of a curriculum studies.

They do not know what the problem will be until it is presented. They discuss the problem, generating hypotheses based on whatever experience or knowledge they have, identifying relevant facts in the case, and identifying learning issues. The learning issues are topics of any sort which are deemed of potential relevance to this problem and which the group feels they do not understand as well as they should. A session is not complete until each student has an opportunity to verbally reflect on their current beliefs about the solution. That is commit to a temporary position and then assume responsibility for particular learning issues that are identified. There are no pre-specified objectives presented to the students. The students generate the learning issues (objectives) based on their analysis of the problem.

After the session, the students all engage in self-directed learning. There are no assigned texts. Rather the students are totally responsible for gathering the information from the available educational library and computer database resources. Additionally, the students may go to the consultants seeking information.

Students are to engage in, especially, authentic problem solving and they must own the problem and the problem become to have the ownership of the students. Tutor uses the facilitory teaching skills during the course of the small group, learning process is the major determinant of the quality and the success of any educational aimed at:1)developing students' thinking or reasoning skills(problem-solving, meta-cognition, critical thinking) as they learn, and 2)helping them to become independent, self-directed learners (learning to learn, learning management).Tutoring is a teaching skill central to problem-based, self-directed learning. The task of educators is to acknowledge, cultivate, exploit and enhance the meta-cognitive, or awareness of the process of learning, is a critical ingredient to successful learning.

Many, many studies, including a several major reviews, that compare problem-based curricula to more traditional curricula, to have been published in the last three decades. No study, however, has looked specifically at a closed the master of science degree's program. PBL addresses four of the objectives: structuring knowledge for use in the context of curriculum studies, developing an effective development and reasoning process, developing effective self-directed learning skills-knowledge and increasing motivation for learning. In this PBL design, after the students have completed their self-directed study, they return to the problem in its orijinal presentation and determine how they may have better reasoned their way through it; they also evaluate their prior reasoning and knowledge. Reiteration of the problem analysis is way lead to additional self-directed learning (Barrows, 1986,20;481-6).

The purpose of this study is to investigate on selected characteristics and performance outcomes for those students at Akdeniz University, The Faculty of Education who participated in the two curricula track during the second semester that dual curricula were offered and to place these findings in the

context of the course of curriculum studies. Alternate curricular track is classified as the PBL, each curriculum can be described briefly as following.

Standard curriculum is organized in a traditional way with the faculty's expected learning outcomes expressed in behavioral objectives. The Faculty not only specifically what content and skills must be mastered, but also identify the resources with which students are to achieve mastery. Basic curriculum study discipline is the units for the organization and delivery of content through lectures, seminars, etc. Students are primarily evaluated with multiple choice and classical opened questions' assessment throughout each semester.

The problem-based learning curriculum designed for the second semester and uses real problems of curriculum studies as the context in which students learn the basic discipline concepts. The same basic discipline concepts as those taught in the standard curriculum are integrated into the PBL experiences. The major learning activity is the small group tutorial designed for six students and a faculty tutor. Educational objectives include the following acquiring an extensive usable, integrated knowledge base; developing effective and efficient reasoning skills, self-directed skills, an internal motivational to learn, question and understand; developing how to make a plan, organize the instructional task, write down the objectives and evaluate; and interpersonal and group skills that include giving and receiving performance feedback.

There are a number of stages that make up the tutorial process. The first, a climate of learning is established, and various group tasks are assigned. The hypothetico-deductive process is used to reason through the problem. Learning issues as well as information resources will be used for the self-directed learning are identified by the students and then evaluated by them when they return from their self-learning period. After the self-directed learning, the newly acquired information is actively applied back to the problem, the basis for the term-reiterative. The students discuss their newly learned information to achieve integration, abstraction, and transfer. The students asses themselves, their peers, and the tutor. This is done at the end of each unit of curriculum studies.

The goal of PBL-based program and the conventional program is to provide education for the preparation of curriculum developers. Formal lectures were used for the traditional curriculum. Theory and practice courses used the PBL approach and students meet and work together in groups of six(6). Across sectional analytical design using a self-report questionnaire compelling of overall instruments were employed to compare the students' achievements in the two programs, and to ascertain the similarities and differences among them. All students who were completing their program in July 2011 were invited to participate. In the PBL program, the questionnaire was distributed within a small group tutorial during the second to last week of the final term. The students completed the questionnaire during tutorial time and returned it. In the conventional program, the questionnaire was distributed and completed in a class two weeks prior to the end of program. The questionnaire took approximately sixty minutes to complete. Achievement tests and a five point Lickert scale for the satisfaction were used to collect the data (1.not satisfied to

5 very satisfied). The observation forms were also used in during the process of the both courses. It can be schematized the processes as following.

Figure 1. The problem based learning process. Taken from Barrows and Myers (1993).

Methodology

In this study we examine two group meetings that typically occur with a problem. The first meeting occured before self-directed study for students to apply what they already knew and to figure out what they stil needed to learn, and the second followed their self-directed study, in which the students applied

their learning to their problem. The study has two main aims:a) to address the main effects of PBL on two categories of outcomes as knowledge and skills, and b) to address potential moderators of the effect of PBL.

The participants in the study were second year the students of the master of science in the department of educational curricula and instruction who were trained to have the master degree. The facilitator is an educator with a specialty in curriculum studies and an experienced PBL facilitator's educational educator. Students worked over 4 hours in one term which takes four months, approximately three(3) hours each on the problem of each stage of a curriculum studies. The students knew each other but had not previously worked as a group. Each lesson were observed, recorded, analysed and evaluated. Each subject matter was constructed step by step throughout the term. Social instruction, questions-responses, discussions, brainstorms and inquiries were conducted. Of course, educational goals were set up before, and established the hypotheses. Each lesson was analysed and summarized and reported. This report was later shared with the second analyst. All the ideas were member checked with the facilitator to further ensure the reliability of interpretation. The opened-ended questions were also used in the PBL process.

The study demonstrates that expert facilitator has a repertoire of strategies that can be flexibly adapted to meet the goals of PBL. In the study one units uses PBL as the instructional format anda re organised around PBL cases. Students meet ones a week to discuss these PBL cases during three-hour session. A lecturer guides the tutorial group session. Each unit takes four weeks and the lecturer Works together with one group of about 5 or 6 students. 12 students filled the questionnaire, giving a full response. The average age of students is about 26 years, and 8 of students were female, 4 male.

PBL is a method of learning in which students first encounter a problem, followed by a student centered inquiry process. Both content and the process of learning are emphasized in PBL. Axiomatic to PBL is that the problem comes first without advance readings, lectures, or preparation, serving as a stimulus for the need to know. Typically, five to eight students work collaboratively in a group (tutorial), together with one or more faculty facilitators (tutors), to identify and define problems, develop hypotheses to explain the problem(s) and explore what they already know and what they need to learn in order to advance their understanding of the problem(s). Key elements of PBL are the formulation of questions that can be explored and answered through systematic self-directed inquiry and the testing and revision of hypotheses through the application of newly acquired knowledge. Active discussions and analysis of problems, hypotheses, mechanism and learning issues among the students are essential to this process, enabling students to acquire and apply content knowledge and to learn and practice both individual and group communication skills critical to learning without contributing directly or being the primary source of information. The tutorial process is facilitated when the tutor creates an optimal learning environment in which students feel free to be themselves and Express their uncertainties about case-related subjects and the group process. The tutor listens carefully, response, and uses questions to explore and stimulate students'

thinking. In addition, the tutor helps the group set standards for depth and breadth of knowledge, develop reasoning ability, enhance communication skills, adopt professional behaviour and attitutes and develop skills for self and peer assessment.

Students are randomly assigned to groups. The length of time that groups stay together varies from program to program (usually from 12 weeks to a semester) and they meet one or more times per week for 2 or 3 hours. A problem requires two or three sessions, depending on the length of the sessions. The pace of the inquiry process is dictated by the amount of time available for the case and the length and complexity of the case. Self-directed study between sessions is a key part of the process. At every step a long the way students are prompted by the tutor and by each other to explore what they know and to come to the edge of their knowledge, where curiosity is transformed into exploration and then inquiry-a central motive for learning in PBL. In the PBL, the problems come first and relevant facts are gathered, the problems and participants are identified, hypotheses are formed and then existing knowledge is called into action, in this case, collaboratively with community members, if possible. The testing of hypotheses is often evaluated and based on the results and outcomes of actions taken by lecturers.

Student performance rated in the following categories throughout during the second semester: problem-solving performance examination, diognasis and data management by the observation, technical and procedural skills, communication skills, background knowledge, the knowledge of discipline-based on performanceand siscipline-based on tests, application of knowledge-self directed learning, interpersonal relationship,and motivation/dependability/ responsibility. In addition, to determine comparability of performance at the beginning and end of the second semester. AS is mentioned, there are 12 graduates, 6 inthe PBL and 6 in the standard-based (conventional) curricula and the data were collected from them. These component scores from the two different curricula implemented were provided as a comparable measures.

A two-year retrospective study was done to compare the academic perfomance of post-graduates in a reiterative problem-based learning curriculum with that of their counterparts in the Standard curriculum. Two graduating classes' performance on a number of outcome measures and practice examination performance, were compared. The study is on the effectiveness of problem-based learning strategy in curriculum studies' knowledge and skills of the graduates for the master of science degree. There are two hypotheses to test in this study:

1. There will be no significant difference the knowledge and skills of curriculum studies for the graduates through PBL and the traditional strategies.
2. There will be no significant difference in the academic (scholastic) achievement of graduates when thought through PBL and the traditional strategies.

The experimental method was adopted to test these hypotheses for the present study. The pretest-posttest equivalant group design was used to study

the effect of the independent variable on the dependent variables. The variables in the study are as following.

-Independent variables:

.Pronlem-based learning(strategy)

.Lecturing

-Dependent variables:

.Achievement: plnning, information management strategies, procedural knowledge, knowledge about curriculum studies, the skills, performance how to plan and evaluate, how to establish objectives, organize the instructional task and apply,and then how to measure and evaluate a curriculum.

12 students of the master of science in the Department of the Educational Curricula and Instruction from the Faculty of Education were used for the study. The technique of sampling used in the selection of the faculty of education was purposive. There were conrtol group which consisted of 6 graduates in the control group and 6 graduates in the experimental group. The two groups were equalized on the basis of their scores on the knowledge and skills of curriculum studies. The traditional strategies were used for the control group and the PBL strategy for the experimental group. The course took four months. On the basis of the reseach problem and the variables identified the investigator prepared an achievement tests. The achievement tests were prepared on the contents of curriculum studies' course and used it for the study as a tool. In order to study the effect of PBL on the dependable variables it was essential to design and develop the PBL package using an appropriate strategy for instructional designing. Some statistical analyses were used such as descriptive: mean, Standard deviation, skewness and kurtosis, and inferential:t-test and analysis of co-variance (ANCOVA).

Findings and Discussions

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As the results of this study, it was found that:

1)The experimental group(EG) performed significantly better than the control group on the aspect of the knowledge of curriculum studies. EG performed significantly beter than the control group on the application of their knowledge on how to plan and evaluate a curriculum and also on planning and information management.

2) The experimental group(EG) performed significantly better than the control group on the total knowledge of curriculum studies, approaches and planning in order to establish curriculum in accordance with each approach. In the end of the course, the EG performed significantly beter than the control group on the Achievement Tests.

The main effect of PBL on knowledge skills is differentiated. Studies in PBL are better in applying their knowledge and skills. In fact, no result reported significant negative findings, however, PBL has a little negative effect on the knowledge base of studies compared with the knowledge of students in the conventional learning environment. In the PBL environment, the students are immediately compelled to apply their knowledge to the problems that they

confront. On all levels there is a strong possitive effect of PBL on the skills of the students. Analyses indicate that students in the PBL curriculum performed at least as well as, and in some instances beter than their counterparts in the standard curriculum. The students in the PBL curriculum, a student-directed curriculum were not disadvantaged. Of note is their strong practical performance and knowledge on the subject. Students in PBL have slightly less knowledge but more of the acquired knowledge.
The scores of the pretests and post-tests for the both experimental and control groups are as following:

Table1. The Scores of the Pretests and Post-tests for the Both Experimental and Control Groups

Pre-test Scores						Post-test Scores					
Group	n	x	sd	t	p	Group	n	x	sd	t	p
Exp.	6	38.62	16.3	-0.371		Exp.	6	39.7	13.8	3.178,	
Control	6	51.77	16.4	p=.358		Control	6	41.9	13.5	p=.002	

The pretest result between the groups (t(93) is -371; $p<0.05$, and no significant difference. The results of the post-tests between the groups (t(93)is 3.178; $p<0.05$, therefore there is no significant difference between the experimental group and the control group on the theoritical knowledge of curriculum studies.

Results of the analyses of variables indicate that the PBL students are significantly higher how students each curricular track scored at the top and bottom of the performance scale was compared. Six (74%) of the PBLC students achieved, compared to six(54%)of the students in the standard curriculum, a difference that was significant at 0.122, and 6(28%)of the PBLC students were inducted into Alpha. Omega Alpha, compared to 6(13%)of the Standard curriculum students, another significant difference at .0175. 2 students required remedial activity; this difference was not significant. It is not the matter of that one has been able to demonstrate an important advantage of one curriculum over the other. Each one is important to choose the suitable in order to teach in a right way. Our total scores show no difference beween the PBL and the conventional curriculum, but the PBL seemed to integration of the theorical knowledge and the application. The students in the PBL show that they are being enhanced from their participation in a problem-based curriculum. The students of PBL rated themselves higher in the areas of communication and teaching-learning. There are no significant differences between the groups in the areas of theoretical knowledge of curriculum studies. The PBL students in this study expressed significantly greater levels of satisfaction with their educatonal experience than their counterparts in the conventional program.

As it is mentioned in the beginning of this studt, the purpose of the study was to compare graduating the students of the master of sciense degree

in the problem-based curriculum with those in the coventional curriculum with regard to perceived preparation for the knowledge and practice, and satisfaction with their education in the duration of the course of curriculum studies. The PBL students scored significantly higher on perceptions of the knowledge of curriculum studies and using the knowledge how to construct a curriculum. They seemed to be more satisfied with their education and the experience than their counterparts in the conventional program, indicating higher satisfaction with tutors, level of independence, assessment and program outcomes, but no difference in relation to workload or clarity of expectations. It can be said that the PBL is as effective as conventional approaches in preparing curriculum developers. The results indicate that the PBL approach is viewed possitively by learners who described it as enjoyable, interactive, practical and holistic. This study contributes to our understanding of the relationship between different educational approaches and student-outcomes. It suggests that PBL is one of the effective approaches for educating the curriculum developers.:

The analyses have shown that PBL possitively influences the knowledge and skills of awareness, applicating their own knowledge and the skills on how to develop a curriculum from the different approaches' point of views as well as the achievement of the graduates of the master of science for the curriculum studies. The present study shows that PBL scores over traditional approaches in the development knowledge and skills of curriculum studies. The experiential process of PBL requires the learners to organize, plan, monitor their comprehension and also manage the rast store of information related to the problem. It thereby equips the learners with procedural knowledge, as is reflect in the study. This emplies that through PBL, the graduates realized how to implement learning procedures in various situations. They also became adopt at obtaining knowledge through discovery, co-operative learning, and problem solving. The students set goals and then plan their learning process and through constant reflection of the types mentioned earlier, they obtain and process the information more efficiently using skills such as organising, elaborating, summarizing and selecting, and focusing on. They became the self-directed learners. Thus it is a strategy that ought to be incorporated in the developers' preparation courses.

With multiple purposes for problem-based learning, it is important to consider a variety of education techniques such as written examination, practical examinations, concept-maps, peer assessments, self-assessment, facilitators/tutors' assessments, oral presentations, written reports. The PBL can also be used to bridge the gap between the theory and practice of teacher education. It is therefore recommented that teacher education institutions should work towards institutionalization of Problem-Based Learning.

References

Barrows, H. S. (1985). *How to Design a Problem-based Curriculum for the Preclinical Years*. New York: Springer Publishing Co.

Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical Education*, 20, 481-486.

Barrows, H. S. (1992). *The Tutorial Process*. Springfield, IL: Southern Illinois University School of Medicine.

Barrows, H.S.&Myers, A.C. (1993). Problem-based learning in secondary schools. Unpublished Monograpgh Springfield. Lauphier High School. Southern Illions.

Barrows, H. S. (1996). Problem-based learning in medicine and beyond: a brief overview. *New Directions For Teaching and Learning*, 68, 3-11.

Bereiter, C., & Scardamalia, M. (2000). Process and product in Problem-Based Learning (PBL) research. In D. H. Evensen, and C.E. Hmelo (Eds.), *ProblemBased Learning, A Research Perspective on Learning Interactions* (pp.185-195). Mahwah, NJ: Lawrence Erlbaum Associates.

Chi, M. T. H., Glaser, R. &Ress, E. (1982). Expertise in problem solving. In R. Sternberg (Ed.), *Advances in the psychology of human intelligence* (pp.7-76), Erlboum.

Collins, A., Brown, J.S., and Newman, S. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L.B.Resnick (Ed.), *Knowing, Learning, and Instruction: Essays in honor of Pobert Glasser*, (453-494) Erlboum.

De Corte, E. (1990). Toward powerful learning environments for the acquisition of problem-solving skills. *European Journal of Psychology of Education*, 5(1), 5-19.

De Corte, E. (1995). Fostering cognitive growth: A perspective from research on marhematics learning and instruction. *Educational Psychologist*, 30(1), 37-46.

Dolmans, D. H., Wolfhagen, I. H. & Ginns, P. (2010). Measuring approaches to learning in a problem-based learning context. *International Journal of Medical Education*, 1: 55-60.

Hmelo-Silver, C.E. (2004). Problem-based learning: what and how do students learn? *Educational Psychology Review*, 235-266.

Newman, M.J. (2005). Problem-based learning. *Journal of Veterinary*, 32(1), 12-20